Model-Based Design Tools for Extending COTS Components To Extreme Environments, Phase I

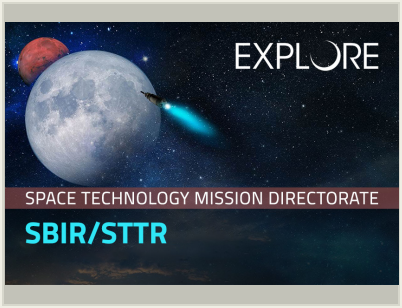
Completed Technology Project (2005 - 2005)

Project Introduction

The innovation in this Phase I project is to prove the feasibility of using model-based design (MBD) tools to predict the performance and useful life of commercial-off-the-shelf (COTS) components and COTS-based systems outside of their rated temperature range. These tools will consist of novel modeling tools, advanced system and data analysis capability. The modeling tools will differ from all known technologies in that they will facilitate the capture of experimental data on COTS devices that will get automatically transformed through novel modeling methods into newly created behavioral models with performance degradation and lifetime effects. These tools are relevant and important in providing NASA the means to quantify the reliability and lifetime (i.e., capability and risk) of COTS components and COTS-based systems and provide a trade structure for the assessment of competing technologies. Furthermore, these novel modeling and design tools will provide a means of integrating disparate models, allow agile evolution of models, and encourage MBD reporting mechanisms be used in reviews. Ultimately, these MBD tools will enable lower-cost system development and cost versus lifetime assessment, shorten development time, and extend flight-proven technology to broader applications.

Anticipated Benefits

Lynguent's tools are designed to be more mainstream than simply extreme environments. Since these tools are based on hardware description languages, they are applicable to any discipline (electrical, mechanical, hydraulic) where models can be expressed in terms of differential, algebraic equations. Event-driven phenomena can be modeled and simulated (i.e., digital or analog event-driven). The mix of these disciplines is also possible (i.e., mixed-technology). So, among the non-NASA applications are any electronics-based design involving analog, digital, mixed-signal electronics as well as mixed-technology systems such as MEMS. This is an incredibly broad market spanning the transportation and semiconductor industries and military applications. The potential NASA applications include all manned and unmanned vehicles that involve electronics (COTS-based or not). The tools being developed at Lynguent will offer a consistent approach to modeling, simulation and data management, test bench development, archival of test and simulation data along with the models used for design, and specification management. The API-based approach will enable this collaborative design environment to be used for modeling and design debugging in all of the commercially available tool flows. Thus, as a 3rd party add-on tool suite, these tools will apply to electronics and mixed-technology systems that go onboard all NASA vehicles.



Model-Based Design Tools for Extending COTS Components To Extreme Environments, Phase I

Table of Contents

Project Introduction 1
Anticipated Benefits 1
Organizational Responsibility 1
Primary U.S. Work Locations and Key Partners 2
Project Management 2
Technology Areas 2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

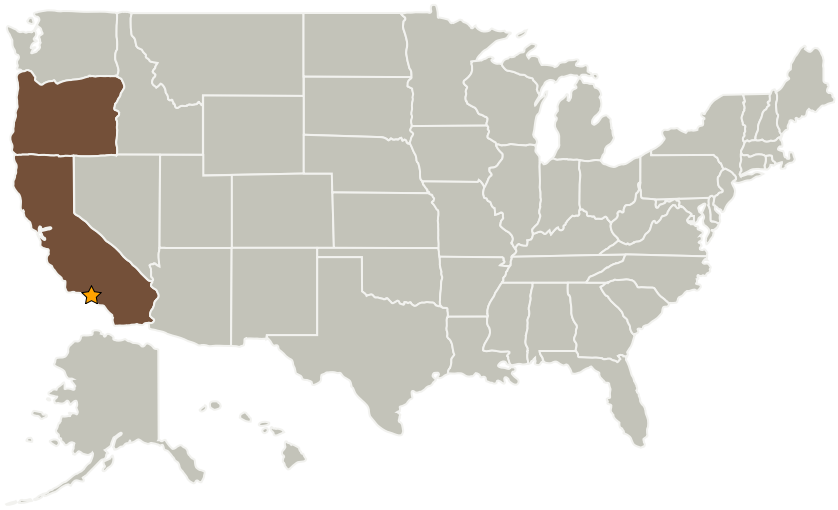
Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Model-Based Design Tools for Extending COTS Components To Extreme Environments, Phase I

Completed Technology Project (2005 - 2005)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Lynguent, Inc.	Supporting Organization	Industry	Portland, Oregon

Primary U.S. Work Locations	
California	Oregon

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Project Manager:
Celestino Jun Rosca

Principal Investigator:
Martin Vlach

Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.4 Vehicle Systems
    - TX09.4.5 Modeling and Simulation for EDL